SPECIFICATION AMENDMENTS

On page 1, insert above line 1, insert--Priority Claim

The present application claims priority on European Patent Application 02016091.7 filed 19 July 2002.--

On page 1, above line 1, insert--Field of the Invention--

Paragraph at line 1 of page 1 has been amended as follows:

-- The invention is directed to ~~an improved use of~~ <u>a process for operating</u> a yellow flame burner.

On page 1, above line 3, insert--Background of the Invention--

Paragraph at line 17 of page 1 has been amended as follows:

-- The general pattern of the flame of such an oil burner assembly is one of heterogeneity in terms of fuel concentrations; the pockets of fuel lean mixture give rise to high nitric oxide concentrations from both the fuel nitrogen and the atmospheric nitrogen, while the pockets of fuel rich mixture give rise to soot. The visible flame when using an Industrial Gas Oil fuel from such a system is yellow. The yellow ~~colour~~ <u>color</u> is the visible radiation from the high temperature soot particles and this completely masks other visible radiations as far as the human eye is concerned. These soot particles result from ~~non-burnt~~ <u>unburned</u> carbon.--

On page 2, delete line 14 and 15.

On page 2, after line 13, insert--Summary of the Invention

The invention is directed to a process for operating a yellow flame burner comprising:

burning a Fischer-Tropsch derived fuel in the burner to obtain flue gasses and a flame.--

On page 2, above line 14, insert--Brief Description of the Drawings

Fig. 1 shows a schematic representation of a yellow flame burner.

Fig. 2 shows the NOx emission relative to the energy input at different Lambda valves for oils A-D in the Examples.

Fig. 3 shows the CO emission relative to the energy for different valves of Lambda for oils A-D in the Examples.

Fig. 4 shows the carbon monoxide emission as a function of time for Example 3.

Fig. 5 shows the hydrocarbon emissions as a function of time for Example 3.--

On page 2, above line 14, but after the above insert, insert--Detailed Description of the Invention--

On page 3, delete line 1-2.

Paragraph at line 16 of page 2 has been amended as follows:

-- Applicants have found that the low NOx emissions of a yellow flame burner can be reduced when the burner is operated by a process comprising burning a Fischer-Tropsch derived fuel ~~is used~~. Applicants have even found that the NOx emission can be reduced to below the level of a blue flame burner using conventional Industrial Gas Oil as fuel. An even further advantage is that the carbon monoxide emission is reduced. A next advantage is that less ~~odour~~ odor during start and extinction of the yellow flame burner has been observed when ~~using this fuel~~ operating the burner via the inventive process. This is very advantageous, especially when such a burner is used in a domestic environment, wherein frequent start and stops of the burner are common. A next advantage is that the carbon monoxide and hydrocarbon emissions at the cold or hot start of the yellow flame burner are less as compared to when state of the art oil is used. This is also very advantageous when the burner is used in for example a domestic heating application wherein frequently the burner has to start and stop.--

Paragraph at line 3 of page 3 has been amended as follows:

-- Fig~~ure~~ 1 shows a yellow flame burner 1 having pumping means 2 to supply a liquid fuel and a ~~van~~ fan 3 to supply an oxygen containing gas. The oxygen containing gas is usually air. The fuel is dispersed in a nozzle 4 and mixed with the air to form a

combustible mixture, which is fed to a combustion space 5 via a conical shaped nozzle 6. Figure 1 also shows means 7 to ignite the mixture. --

Paragraph at line 11 of page 3 has been amended as follows:

-- The operating conditions of the yellow flame burner may be the same as the operating conditions used for the state of the art fuels. The proportion of air in excess of that required for stoichiometric combustion is known as the excess air ratio or "lambda", which is defined as the ratio of total air available for combustion to that required to burn all of the fuel. Preferably the lambda is between 1 and 2 and more preferably between 1 and 1.6. Applicants found that by ~~using~~ burning a Fischer-Tropsch derived fuel a very low lambda of between 1.05 and 1.2 could be applied without large emissions of carbon monoxide as would be the case when Industrial Gas Oil ~~would be used~~is burned in such a burner.--

Paragraph at line 23 of page 3 has been amended as follows:

--The yellow flame burner ~~using the Fischer-Tropsch fuels~~ operated under the inventive process is preferably applied for domestic heating, wherein the heat of combustion is used to heat water by indirect heat exchange in so-called boilers. The heated water may be used to warm up ~~the~~ a house or consumed in for example showers and the like. More preferably, the yellow-flame burner is used in (domestic) applications wherein more than 3 starts of the burner per hour ~~takes~~ take place. The ~~use of the~~ present invention is especially suited for such applications because low hydrocarbon and carbon monoxide emissions have been found at the start of the burner running on the Fischer-Tropsch derived fuel.--

Paragraph at line 3 of page 4 has been amended as follows:

-- The yellow flame burner ~~using the Fischer-Tropsch fuels~~ operated via the inventive process may advantageously be further used for direct heating of large spaces. Such applications are characterized in that the flue gasses gas are directly supplied to said space to heat up said space. Spaces such as tents and halls are often heated up with such an apparatus. Normally gaseous fuels, for example natural gas, LPG and the like, are used for this application because the associated flue gasses can be safely supplied to said space. A disadvantage of the use of gaseous fuels is however that handling of the pressurized gas containers and combustion equipment requires professional skills in order to operate such

an apparatus safely. By using a Fischer-Tropsch derived liquid fuel a comparable flue gas is obtained in the yellow flame burner as when a gaseous fuel is used. Thus, a method is provided wherein a liquid fuel can be applied for direct heating of spaces. The application of the liquid Fischer-Tropsch derived fuel makes the use of the apparatus for direct heating much more simple and safe.--

Paragraph at line 23 of page 4, ending at line 6 of page 5, has been amended as follows:

-- The Fischer-Tropsch derived fuel will comprise a Fischer-Tropsch product which may be any fraction of the middle distillate fuel range, which can be isolated from the (hydrocracked) Fischer-Tropsch synthesis product. Typical fractions will boil in the naphtha, kerosene or gas oil range. Preferably, a Fischer-Tropsch product in the kerosene or gas oil range is used because these fractions are easier to handle in for example domestic environments. Such products will suitably comprise a fraction larger than 90 wt% which boils between 160 °C and 400 °C, preferably to about 370 °C.
Examples of Fischer-Tropsch derived kerosene and gas oils are described in EP-A-583836, WO-A-9714768, WO-A-9714769, WO-A-011116, WO-A-011117, WO-A-0183406, WO-A-0183648, WO-A-0183647, WO-A-0183641, WO-A-0020535, WO-A-0020534, EP-A-1101813, US-~~A~~-Pat. No.5766274, US-~~A~~-Pat. No.5378348, US-~~A~~-Pat. No.5888376 and US-~~A~~-Pat. No.6204426 all of which are hereby incorporated by reference.--

Paragraph at line 7 of page 5 has been amended as follows:

--The Fischer-Tropsch derived product will suitably contain more than 80 wt%, preferably more than 90 wt% iso and normal paraffins and less than 1 wt% aromatics, the balance being naphthenics compounds. The content of ~~sulphur~~ sulfur and nitrogen will be very low and normally below the detection limits for such compounds. This low content of these elements is due to the specific process wherein the Fischer-Tropsch reaction is performed. The content of ~~sulphur~~ sulfur will therefore be below 5 ppm and the content of nitrogen will be below 1 ppm. As a result of the low contents of aromatics and naphthenics compounds the density of the Fischer-Tropsch product will be lower than the conventional mineral derived fuels. The density will be between 0.65 g/cm^3 and 0.8 g/cm^3 at 15 °C. --

Paragraph at line 21 of page 5, ending at line 8 of page 6, has been amended as follows:

-- The fuel used in the process of the present invention may also comprise fuel fractions other than the Fischer-Tropsch derived fuel components. Examples of such components may be the kerosene or gas oil fractions as obtained in traditional refinery processes, which upgrade crude petroleum feedstock to useful products. Preferred non-Fischer-Tropsch fuel fractions are the ultra low ~~sulphur~~ sulfur (e.g. less than 50 ppm ~~sulphur~~ sulfur) kerosene or diesel fractions, which are currently on the market. Optionally non-mineral oil based fuels, such as bio-fuels, may also be present in the fuel composition. The content of the Fischer-Tropsch derived product in the fuel will be preferably be above 40 wt%, more preferably above 60 wt% and most preferably above 80 wt%. It should be understood that the content of such, currently less available, Fischer-Tropsch products will be ~~optimised~~ optimized, wherein pricing of the total fuel will be balanced with the advantages of the present invention. For some applications fuels fully based on a Fischer-Tropsch product plus optionally some additives may be advantageously used.--

Paragraph at line 9 of page 6, ending at line 3 of page 7, has been amended as follows:

-- Yellow flame burners are often provided with a flame detector. Most detectors, which are used today, detect a particular wavelength associated with the yellow ~~colour~~ color of the flame. Applicants have now found that when a Fischer-Tropsch derived fuel is used the commonly known detectors fail to observe the resulting blue ~~coloured~~ colored flame. For this reason the yellow flame burner is preferably provided with a detector~~,~~ which can detect this blue flame. Examples of suitable detectors are the detectors that are used in blue flame burners. Examples of suitable detectors are the UV sensors and IR sensors. A more preferred detector is the so-called ~~ionisation~~ ionization sensor. An ~~ionisation~~ ionization sensor is suitable to monitor burners with intermittent operation as well as continuous operation. The principle of operation of the ~~ionisation~~ ionization flame monitor is based on the rectifying effect of a flame. If a flame is present, a current flows between the burner an the ~~ionisation~~ ionization electrode. This ~~ionisation~~ ionization current is evaluated by the flame monitor to determine if a flame is present. In some prior art applications ~~ionisation~~ ionization sensors could not be used in combination with a liquid fuel because deposits in the sensor led to false currents in the sensor. Because ~~use of~~ burning the Fischer-Tropsch derived fuel, especially a fuel composition not containing a metal based combustion improver additive, results in less deposits ~~ionisation~~ ionization

sensors can be applied. This is an advantage because these sensors are more readily available than the IR or UV sensors.--

Paragraph at line 4 of page 7 has been amended as follows:

--Alternatively additives may be added to the Fischer-Tropsch derived fuel which result in a flame which can be detected by the above standard yellow flame burner detector. Examples of possible additives are azo dyes and alkali metal based additives, for example based on ~~Na~~ sodium or ~~K~~ potassium.--

Paragraph at line 10 of page 7 has been amended as follows:

-- The fuel may also comprise one or more of the following additives~~.~~: detergents, ~~Detergents,~~ for example OMA 350 as obtained from Octel OY; stabilizers, for example Keropon ES 3500 as obtained from BASF Aktiengesellchaft, FOA 528A as obtained from OCTEL OY; metal-deactivators, for example IRGAMET 30 (as obtained from Speciality Chemicals Inc; (ashless) dispersants, for example as included in the FOA 528 A package as obtained from Octel OY; anti-oxidants; IRGANOX L57 as obtained from Specialtiy Chemicals Inc; cold flow improvers, for example Keroflux 3283 as obtained from BASF Aktiengesellschaft, R433 or R474 as obtained from Infineum UK Ltd; anti-corrosion: Additin RC 4801 as obtained from Rhein Chemie GmbH, Kerocorr 3232 as obtained from BASF, SARKOSYL 0 as obtained from Ciba; re-odorants, for example Compensol as obtained from Haarman & Reiner; biocides, for example GROTA MAR 71 as obtained from Schuelke & Mayr; lubricity enhancers, for example OLI 9000 as obtained from Octel; dehazers, for example T-9318 from Petrolite; antistatic agents, for example Stadis 450 from Octel; and foam reducers, for example TEGO 2079 from Goldschmidt.--

Paragraph at line 32 of page 7, ending at line 6 of page 8, has been amended as follows:

-- Applicants found that metal-based combustion improvers, which typically are added to the fuel composition used in the prior art method, can be left out of the fuel. This is advantageous because as explained above ~~ionisation~~ ionization sensors may then be advantageously applied. Metal-based combustion improvers are for example ferrocene, methylcyclopentadienylmanganese-tricarbonyl (MMT).--

Paragraph at line 7 of page 8 has been amended as follows:

-- The Fischer-Tropsch derived product is ~~colourless~~ colorless and ~~odourless~~ odorless. For safety reasons an ~~odour~~ odor marker, as for example applied in natural gas for domestic consumption, may be present in the Fischer-Tropsch derived fuel. Also a ~~colour~~ color marker may be present to distinguish the fuel from other non-Fischer-Tropsch derived fuels.--

Paragraph at line 18 of page 8 has been amended as follows:

-- To a yellow flame burner of Type 800 ULV-S (Shell Direct GmbH) as placed in a PKR-140 boiler (Oertli Rohleder Waermetechnik GmbH) a Fischer-Tropsch derived kerosene (Oil A), a Fischer-Tropsch gas oil (Oil B), an ultra low ~~sulphur~~ sulfur gas oil (Oil D) and a standard industrial gas oil (Oil C) having the properties as listed in Table 1 was fed at different lambda. The oils contained the same standard additive package.--

The table on page 9 has been amended as follows:

Table 1

	Fischer-Tropsch kerosene (A)	Fischer-Tropsch gas oil (B)	Reference oil-1 (C)	Reference oil-2 (D)
Density (at 15 °C in kg/m^3	734.8	785.2	854.3	846.3
~~Sulphur~~ Sulfur content (wt%)	<0.0005	< 0.0005	0.142	0.061
Kinematic viscosity at 20 °C (mm^2/s)	1.246	6.444	3.842	4.621
Flash point (°C)	43	92	64	66

Paragraph at line 3 of page 9 has been amended as follows:

-- During the experiment the NOx content was measured by chemoluminescence. In ~~Figure~~ Fig 2 the NOx emission relative to the energy input is shown at different Lambda values

for the ~~fuels~~ oils A-D. The energy in kWh is calculated from the amount of fuel fed to the burner and its caloric value. It is clear that the NOx emissions are lower for the Fischer-Tropsch derived fuels as compared to when a normal gas oil or an ultra low ~~sulphur~~ sulfur gas oil is used.--

Paragraph at line 11 of page 9 has been amended as follows:

-- The carbon monoxide emission was also measured. In Fig.~~ure~~ 3 the CO emission relative to the energy is presented for different values of lambda for oils A-D.

Example 2.--

Paragraph at line 5 of page 10 has been amended as follows:

-- Example 1 was repeated for oils A, B and D. The hydrocarbon and carbon monoxide emissions were measured at a warm start up. ~~With a~~ A "warm start up" is ~~here meant~~ means that the boiler temperature was kept constant at its operating temperature. In Fig~~ures~~. 4 and 5 the carbon monoxide and hydrocarbon emissions are shown as a function of time. It can be observed that both the CO and hydrocarbon emissions are ~~less~~ lower when a Fischer-Tropsch derived fuel is used when compared to when conventional gas oil is used.--

Paragraph at line 16 of page 10 has been amended as follows:

-- Example 1 with the Fischer-Tropsch kerosene was repeated using a flame detector. The flame detector was a so-called photo-element, which delivers amperes (mA) as an output signal. A high output signal is desirable to make correct detection of a flame possible. The output signal of the neat Fischer-Tropsch kerosene was 52.7 mA. --

On page 11, above line 1, insert --We claim:--